

CBNSF 17.5.3



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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

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September 30, 1999

Ms. Kris Flint
U.S. Environmental Protection Agency
Region X
1200 6th Avenue, HW-113
Seattle, WA 98101-3188

Dear Ms. Flint:

Re: Milestone 4 Source Control Status Report for Head of Hylebos Waterway
Problem Area: Commencement Bay Nearshore/Tideflats Superfund Site

I have enclosed a report addressing Milestone 4 for the Head of Hylebos Waterway Problem Area at the Commencement Bay Nearshore/Tideflats (CB/NT) Superfund Site. Milestone 4 is met when administrative actions are in place to control all sources of problem chemicals to the Head of Hylebos Waterway Problem Area.

The report for Milestone 2 (administrative actions in place for major sources) was issued March 26, 1993. The Milestone 3 Report (source control actions complete for major sources) was submitted September 14, 1999.

Source control actions are those physical changes (e.g., construction, soil removal) that represent elimination and/or reduction, to the extent practicable, of those contaminant sources that are most directly linked to existing sediment impacts. These actions eliminate or reduce to the extent practicable, all known sources of problem chemicals that could potentially contaminate sediments.

All ongoing confirmed sources are listed in the Milestone 1 Report for the Head of Hylebos Waterway Problem Area, issued May 4, 1993. No additional sources of problem chemicals have been identified to date. However, the Department of Ecology (Ecology) and EPA have decided to also include in this report information on source control related to woodwaste from log sort yards. Excessive accumulations of woodwaste in part of the Head of Hylebos ("Hylebos Wood Debris Site") has reduced the diversity and abundance of benthic organisms in the Head of Hylebos Waterway, resulting in an exceedance of State Sediment Management Standard narrative criteria for Cleanup Screening Level (minor adverse impacts), Chapter 173-204-520(1)(a) and 173-204-520(5)WAC.

Ecology recognizes that additional sources may appear as new businesses locate near the Head of the Hylebos Waterway. Ecology will conduct routine inspections to identify any new potential source control problems.

The approach to controlling sources of problem chemicals to the Head of Hylebos Waterway Problem Area is provided in an EPA document titled "Source Control Strategy -- Commencement Bay Nearshore/Tideflats Superfund Site" (May 1992).

This Milestone Report does not address all bank areas (from 0-12 ft. MLLW) that are potential sources of contamination to the waterway. Depending on the type and extent of contaminants in

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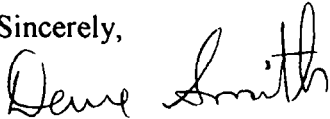
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the bank areas, these areas have been addressed under Ecology's source control actions or will be addressed as part of sediment cleanup. This determination is made jointly by EPA and Ecology on a case-specific basis. If the intertidal area was addressed by Ecology as part of a source control cleanup action, it is discussed in this report.

Sincerely,

A handwritten signature in cursive script, appearing to read "Dave Smith".

Dave Smith
Unit Supervisor
Toxics Cleanup Program
Southwest Regional Office

DS:td
Enclosure(s)

Milestone 4: Administrative Actions in Place for All Sources

Purpose and Background

Milestone 4 is met when administrative actions are in place for all sources of problem chemicals to the Head of Hylebos Waterway Problem Area.

Source control actions are those physical changes (e.g., construction, soil removal) that represent elimination and/or reduction, to the extent practicable, of those contaminant sources that are most directly linked to existing sediment impacts. Ultimately, these actions eliminate or reduce to the extent practicable, all known sources of problem chemicals that could potentially contaminate sediments.

All ongoing confirmed sources are listed in the Milestone 1 Report for the Head of Hylebos Waterway Problem Area, issued May 4, 1993. No additional sources have been identified to date. However, Ecology and EPA have decided to also include in this report information on source control related to woodwaste from log sort yards. Excessive accumulations of woodwaste in part of the Head of Hylebos ("Hylebos Wood Debris Site") has resulted in reduced diversity and abundance of benthic organisms, resulting in an exceedance of Washington State Sediment Management Standards (narrative criteria).

Ecology recognizes that additional sources may appear as new businesses locate near the Head of the Hylebos Waterway. Ecology will conduct routine inspections to identify any new potential source control problems.

The approach to controlling sources of problem chemicals to the Head of Hylebos Waterway Problem Area is provided in an EPA document titled "Source Control Strategy -- Commencement Bay Nearshore/Tideflats Superfund Site" (May 1992).

This Milestone Report does not address all intertidal areas (from 0-12 ft. MLLW) that are potential sources of contamination to the waterway. Depending on the type and extent of contaminants in the bank areas, these areas will be addressed under Ecology's source control actions or as part of sediment cleanup. This determination has been made jointly by EPA and Ecology on a case-specific basis. If the intertidal area was addressed by Ecology as part of a source control cleanup action, it is discussed in this report.

Other Source Control Milestone Reports for the Head of Hylebos Waterway Problem Area

The Milestone 1 Report (submitted to EPA May 4, 1993) identified all confirmed ongoing sources of problem chemicals to the Head of Hylebos Waterway Problem Area. The Milestone 1 Report listed nine major sources and eight other sources. Major sources are those that have been identified as such in the Commencement Bay NS/TF Record of Decision and the Integrated Action Plan.

The Milestone 2 Report describes the administrative actions in place to control the major sources. Ecology submitted the Milestone 2 Report for the Head of Hylebos Waterway Problem Area to EPA May 19, 1993.

The Milestone 3 Report is issued when source control actions are complete for major sources. Ecology is submitting the Milestone 3 Report for the Head of Hylebos Waterway to EPA concurrently with this Milestone 4 Report.

Milestone 5 is achieved when source control is complete for all ongoing confirmed sources.

Administrative Actions in Place for Major Sources

Major sources are those that have been identified as such in the Commencement Bay NS/TF Record of Decision and the Integrated Action Plan. There are nine major sources for the Head of Hylebos Waterway Problem Area:

Kaiser Aluminum (metal fabricator),
Elf Atochem -- 3009 Taylor Way (inactive log sort yard),
Elf Atochem -- 2901 Taylor Way (chlorine-based chemicals),
General Metals (metal scrap yard),
Wasser Winters (inactive log sort yard),
Louisiana Pacific (operating log sort yard),
Tacoma Boat (inactive large shipyard),
B&L Landfill (drains to Hylebos Creek), and
Blair Backup Property (inactive log sort yard).

The Milestone 3 Letter Report describes administrative actions in place for all major sources. It was issued to EPA concurrently with this report.

Administrative Actions in Place for Other Sources

The Milestone 1 report also lists eight other confirmed sources:

Modutech Marine,
Jones-Goodell,
Hylebos Marina,
Nordlund Boat,
U.S. Gypsum Interiors,
Murray Pacific Log Yard #1,
U.S. Gypsum Landfill, and
Don Oline Marine View Drive Autofluff.

Sources of wood debris include Louisiana Pacific (arsenic-contaminated soil cleanup described separately as a major source in the Milestone 3 report), Weyerhaeuser, and Manke Lumber. Although not a confirmed source to Hylebos Waterway sediments, the BPA/Occidental site on Fife Ditch was cleaned up under a MTCA Consent Decree in 1998.

The Milestone 1 Report for the Head of Hylebos Problem Area lists one site as "pending" consideration as a confirmed source (Petroleum Reclaiming Services). A "pending" status means that the Washington Department of Ecology (Ecology) needs further information before deciding whether the property is an ongoing source of problem chemicals to the waterway. By October, 1993, Ecology had enough information to make a decision. In a letter dated October 4, 1993, Ecology sent EPA an addendum to the Milestone 1 Report for the Head of Hylebos Waterway Problem Area indicating that Petroleum Reclaiming Services was not considered a confirmed ongoing source of problem chemicals to the Head of Hylebos Waterway Problem Area.

1. Modutech Marine (2218 Marine View Drive; NPDES Permit)

Description of Site and Contamination

Modutech Marine, Inc. is a boat construction and repair facility that has operated at 2218 Marine View Drive since 1983. At one time, waste sandblast grit from sand blasting of boat hulls was spread on roads and surfaces in certain areas of the site. Ecology sampled grit deposits near the shoreline and near the sandblast shed in February 1991, and detected copper, lead, zinc, mercury, LPAH, HPAH, phenol, and bis (2-ethylhexyl) phthalate. Ecology also detected 9.2 ug/kg of PCBs in a sample at the northwest corner of the property in an area that appeared to contain auto shredder residue (ASR). The MTCA Method A, Industrial Cleanup level for PCBs is 10 mg/kg. Ecology

inspectors looked for visual indications of the ASR during site inspections on June 17, 1992 and December 30, 1992. No ASR was observed. However, the area where the fluff was originally identified was covered by fiberglass boat molds, so access was difficult. Modutech reported digging in that area when removing the large stockpile of sandblast grit, and did not observe any ASR.

Before 1993, wash water from boat hull hydroblasting discharged to the Hylebos Waterway. The site is unpaved. Storm water from the north part of the site enters the Hylebos Waterway through a swale that discharges just south of Tacoma storm outfall # 23. At this time there are no other stormwater structures on the site

Source Control Actions

In a letter of August 28, 1992, Ecology requested Modutech to take measures to stop contaminants from spent sandblast grit from reaching the Hylebos Waterway. Modutech agreed to remove spent grit from the site, clean up residual grit on the marine railway and along the intertidal bank area of the site, and implement best management practices for grit management and boat work. Ecology also commented on a shoreline development permit for Modutech in a letter of January 6, 1992, requesting that the permit be conditioned with requirements to identify and remove any sandblast grit that may be uncovered during site improvement activities. The shoreline development permit was for retention of covered moorage, paving the parking area, developing a stormwater swale, and developing a 3:1 slope vegetated buffer zone along the shoreline.

An Ecology site inspection of December 30, 1992 showed that Modutech had removed several truckloads of grit from an old dump area at the north end of the site, from the roadway along the shore, and from around the boat prep shed and sandblast shed. The bulk of the grit, at the north end of the site, had been removed with a backhoe until clean packed sand was observed. The area was then backfilled with clean gravel. The grit along the roadway and around the sheds had been removed with an industrial vacuum. Some surface grit in the northwest corner of the site was also vacuumed. Grit around the marine railway had also been cleaned up at the time of the December 30 inspection.

In a letter dated January 6, 1993, Ecology requested Modutech to dig test pits within a proposed drainage swale and along part of the shoreline that Modutech planned to regrade to a 3:1 slope for a vegetated buffer zone. Ecology observed test pits within the

swale area on August 26, 1993, and within the vegetated buffer zone area on September 21, 1993. No sandblast grit was observed. By the time of the August, 1993 inspection, residual sandblast grit in the intertidal zone had been removed. During a 1994 inspection, Ecology observed that the last of the sandblast grit on the site was scraped up and was awaiting removal. This area of grit was immediately behind the office, in a boat mold storage area. The boat molds had been moved and the grit removed with a vacuum. In the January 6, 1993 letter, Ecology also asked Modutech to describe how they plan to deal with any grit discovered when bank regrading took place. The bank work was delayed until recently. In September, 1998, Modutech sent Ecology a letter explaining that any sandblast grit found during the bank restoration work will be removed, tested, and hauled to an appropriate disposal site. Bank work is scheduled to take place within a year from now.

An Ecology site inspection report from 1991 noted that auto shredder residue (ASR) had been discovered in the northwest corner of the property. This was sampled and found to contain 9.2 ppm PCB's. The MTCA Method A Industrial Cleanup level is 10 ppm. Ecology inspectors looked for visual indications of the ASR during site inspections on June 17, 1992 and December 30, 1992. No ASR was observed. However, the area where the fluff was originally identified was covered by fiberglass boat molds, so access was difficult. Modutech reported digging in that area when removing the large stockpile of sandblast grit and did not observe any ASR. Two intertidal sediment samples taken in front of Modutech for the Hylebos Waterway Cleanup Committee (Striplin Environmental Associates, 1995) contained 100 and 305 ppb PCB's; the Commencement Bay Sediment Quality Objective (CBSQO) is 300 ppb. However, sediment from the same location showed no adverse impacts to aquatic life when tested in bioassays (Striplin Environmental Associates, 1995).

Modutech is covered under the general NPDES stormwater permit for small boatyards. Ecology first issued Modutech a Small Boatyard Permit (#WAG-03-1016) on April 1, 1993, and renewed the permit on January 9, 1998. The permit requires Modutech to:

1. implement best management practices to keep hull scrapings from contact with the waterway directly or indirectly via precipitation,
2. treat or recycle hull wash water; and

3. conduct monitoring of oil and grease, total suspended solids, and copper in stormwater (quarterly in the renewed permit). The permit contains no effluent limits.

Modutech ceased discharge of pressure wash wastewater to the Hylebos Waterway in March of 1993, after installing a closed loop recycle system for treatment of the water. Modutech is adequately implementing BMPs to prevent contaminants from the boat repair and maintenance operation from reaching Hylebos Waterway. As a result of these actions, Modutech is in compliance with their NPDES permit.

Source Control Effectiveness

Stormwater quality is summarized below:

Date Stormwater Sample Was Taken	Total Suspended Solids (ppm)	Total Recoverable Copper (ppb)
10/7/96 (swale)	39	37
11/12/96 (swale)	59	590
1/14/97 (swale)	36	720
1/21/97 (swale)	13	200
10/14/97 (swale)	8	100
5/15/98 (swale)	11	48
5/15/98 (ways)	61	1,300
6/10/98 (swale)	7	62
6/10/98 (ways)	5	1,100
9/18/98 (swale)	47	180
9/18/98 (ways)	71	2,700

These concentrations of copper exceed the marine chronic and acute water quality standards (both are 3.1 ppb). In addition, an intertidal sediment sample taken in front of Modutech for the Hylebos Waterway Cleanup Committee (Striplin Environmental Associates, 1995) contained 657 ppm copper, which exceeds the Commencement Bay Sediment Quality Objective (CBSQO) of 390 ppm (zinc was at 219 ppm, which is below its CBSQO). However, sediment from the same location showed no adverse impacts to aquatic life when tested in bioassays (Striplin Environmental Associates, 1995). The results of sediment bioassays override chemistry results for determining sediment cleanup needs, so the sediment in front of Modutech is not considered sufficiently contaminated to deserve cleanup action.

Ecology is concerned about the water quality standard exceedances, and is working with Modutech and other small

boatyards to find new ways to reduce the metals loading (such as dustless sanders and stormwater treatment).

The appended Technical Memorandum regarding the potential for stormwater discharges to recontaminate sediments suggests no potential for copper to recontaminate. This site is no longer considered a source of problem chemicals to Hylebos Waterway sediments.

2. Jones-Goodell (1690 Marine View Drive; voluntary MTCA cleanup)

Description of Site and Contamination

Jones-Goodell operated a 2-acre ship/boatbuilding and repair facility at this site from 1968 until 1995. In June of 1995, they filed for Chapter 7 bankruptcy and are not currently in operation. A marine railway served as a haul-out and work area for repair and painting of boats. Stormwater from the paved front portion of the site discharged into the gravel yard at the back of the site. The storm drain line from this gravel yard appeared to be broken, and the yard contained puddles and muddy areas during Ecology inspections. Stormwater from a small paved area to the southeast of the building drained to a sump for the old boatwash system.

In 1992 Ecology inspected the site and discovered spent sandblast grit used as fill behind a bulkhead at the marine railway. Erosion had caused some of the grit to leak onto the tide flats of the marine railway. Samples of the grit showed it contained copper at 1290 mg/kg, which exceeded the Commencement Bay Sediment Quality Objective (390 mg/kg).

In 1996 and 1997, a prospective purchaser (Way Conn Properties) conducted an investigation of the site (Dames and Moore, 1996; Dames and Moore, 1997). A grid pattern of twenty-eight soil samples were taken from near-surface soil (0-1.2 feet deep) and were analyzed for problem metals and petroleum hydrocarbons. Two samples contained arsenic above the Commencement Bay Sediment Quality Objective of 57 ppm. One sample contained 510 ppm arsenic, located beneath the concrete slab next to a bottomless boat transfer pit. The other sample contained 100 ppm arsenic, and was located in the middle of the boat transfer pit. Heavy oil, which contains PAHs (problem chemical group) was found above the MTCA Level A Cleanup Level (200 ppm) in four samples (250-570 ppm). Three of those samples were in the boat transfer pit, and the other was located where the highest arsenic concentration was found (under concrete slab next to the boat pit).

Groundwater was sampled for metals analysis at 3-5 feet below ground surface from ten site locations and at 25 feet below ground surface at three site locations. All samples contained Hylebos Waterway problem metals below detection limits, with the exception of two shallow groundwater samples, which contained copper at 25 and 33 ppb.

Source Control Actions

In 1992 Ecology requested Jones-Goodell to remove the grit behind the bulkhead and also to remove sandblast grit that had been observed on the ground around the blasting shed. At a later site visit, Ecology inspectors found that the grit behind the bulkhead had been removed, as had the majority of the piles of grit around the blasting shed (some surface grit remained). No stormwater samples were taken for chemical analysis because once the stormwater flowed onto the gravel yard, there was no apparent location where the water flowed from the yard to the waterway (appeared to all infiltrate or pond).

Jones-Goodell was covered under the general NPDES stormwater permit for small boatyards until they ceased operations. They installed a treatment system for their boat wash wastewater in 1992, consisting of an oil/water separator vault that discharged to the sanitary sewer. The City of Tacoma approved the discharge to the sanitary sewer in April, 1994. Prior to construction of the vault in 1992, the wash water discharged to Hylebos Waterway. In May, 1992, Ecology inspectors observed paint residue on the concrete portion of the marine railway, and in the shallow trough. Both of these areas are covered with water at high tides.

In 1997, Way Conn Properties excavated all soil from the bottom of the boat transfer pit to a depth of 12-18 inches (exact depth depended on the observed presence of sandblast grit). In addition, the concrete slab was removed and the underlying soil was removed to a depth of 18-24 inches.

Source Control Effectiveness

Nine confirmation samples below the limits of excavation contained no problem chemicals above the Commencement Bay Sediment Quality Objectives. On December 8, 1997, Ecology sent Way Conn Properties a letter stating that no further action was needed under MTCA for the upland portion of the property (above +12 MLLW).

The source of stormwater contamination (grit/paint) is no longer in contact with stormwater, so Ecology believes this site is no longer a source of problem chemicals to Hylebos Waterway sediments.

The attached Technical Memorandum for the potential of groundwater discharges to recontaminate sediments only evaluates potential from sites at which groundwater data were collected post-cleanup. Even though no groundwater data were gathered post-cleanup at this site, it is useful to note that the groundwater screening concentration for copper, which is fully explained in section 2 of the memorandum, is 4,937 ppb, which is two orders of magnitude greater than pre-cleanup groundwater samples. This further strengthens Ecology's belief that this site is no longer a source of problem chemicals to Hylebos Waterway sediments.

Future Developments at the Site

In August, 1998, Hyland Marine sent Ecology an application for coverage under the General Boatyard Permit to conduct boatyard repair work at the old Jones-Goodell property. The application included plans to construct a washwater recycling system and a stormwater sand filtration trench between the work area and the waterway (1.5 feet deep and 3 feet wide). By October, 1999, the site was regraded, paved, and the washwater recycling system was installed.

3. Hylebos Marina (1940 Marine View Drive; NPDES Permit)

Description of Site and Contamination

Hylebos Marina includes a boat repair yard which has operated at 1940-1950 Marine View Drive since about the mid 1960's. Lessees within this property include Harbor Service and South Sound Marine. The site includes a haul-out pier, a boat washing facility with a recirculating system for wastewater, and a gravel yard where boats are hauled out and worked on. About 200 boats up to 50 feet in length are worked on at the facility per year. Site stormwater is discharged to Hylebos Waterway through a ditch at the northwest end of the gravel yard and through a series of catch basins and an outfall in the parking area near the office. In June 1995 the site owners received a shoreline permit for site improvements, including paving of the gravel yard, upgrading the storm drainage system, installing stormwater filtration swales, and construction of another haul-out and boat wash facility.

Source Control Actions

Hylebos Marina is covered under the general NPDES stormwater permit for small boatyards. Ecology first issued Hylebos Marina a Small Boatyard Permit (#WAG-03-1020) on May 26, 1993, and renewed the permit on January 9, 1998. The permit requires Hylebos Marina to:

1. implement best management practices to keep hull scrapings from contact with the waterway directly or indirectly via precipitation;
2. treat or recycle hull wash water; and
3. conduct monitoring of oil and grease, total suspended solids, and copper in stormwater (quarterly in the renewed permit). The permit contains no effluent limits.

Hylebos Marina ceased discharge of pressure wash wastewater to the Hylebos Waterway in 1993, after installing a closed loop recycle system for treatment of the water. Hylebos Marina is adequately implementing BMPs to prevent contaminants from the boat repair and maintenance operation from reaching Hylebos Waterway. As a result of these actions, Hylebos Marina is complying with their NPDES permit.

Source Control Effectiveness

Stormwater quality is summarized below:

Date Stormwater Sample Was Taken	Total Suspended Solids (ppm)	Total Recoverable Copper (ppb)
10/18/96	25	920
12/5/96	10.5	259
5/14/98	112	2,100
6/24/98	26	810

These concentrations of copper exceed the marine chronic and acute water quality standards (both are 3.1 ppb). The appended Technical Memorandum regarding the potential for stormwater discharges to contaminate sediments suggests a moderate potential for copper in stormwater to recontaminate sediments. However, this analysis does not reflect actual sediment data near the facility. Ecology believes it is unlikely that recontamination of sediments will occur after sediment cleanup takes place in Hylebos Waterway because:

- (1) two intertidal sediment samples taken in front of Hylebos Marina for the Hylebos Waterway Cleanup Committee (Striplin Environmental Associates, 1995) contained copper at 73 ppm and 94 ppm, and zinc at 82 ppm and 268 ppm, which are below the Commencement Bay Sediment Quality Objectives (CBSQO's) (390 ppm for copper and 410 ppm for zinc); and
- (2) sediment from the same location showed no adverse impacts to aquatic life when tested in bioassays (Striplin Environmental Associates, 1995).

Ecology is concerned about the water quality standard exceedances, and is working with small boatyards to find new ways to reduce the metals loading (such as dustless sanders and stormwater treatment).

Ecology no longer considers Hylebos Marina to be an ongoing source of problem chemicals to Hylebos Waterway sediments.

4. Nordlund Boat (1622 Marine View Drive; NPDES Permit)

Description of Site and Contamination

Nordlund Boat has operated a fiberglass boat construction business on this site at 1622 Marine View Drive since 1988. The primary activity at the site is construction and retrofitting of fiberglass pleasure boats. Some repair and painting is also done. The site is paved. Stormwater is routed to a detention basin which drains to Hylebos Waterway.

Source Control Actions

Nordlund is covered under the general NPDES stormwater permit for small boatyards. Ecology first issued Nordlund a Small Boatyard Permit (#WAG-03-1025) on November 5, 1993, and renewed the permit on January 9, 1998. The permit requires Nordlund to:

1. implement best management practices to keep hull scrapings from contact with the waterway directly or indirectly via precipitation;
2. treat or recycle hull wash water; and
3. conduct monitoring of oil and grease, total suspended solids, and copper in stormwater (quarterly in the renewed permit). The permit contains no effluent limits.

Nordlund ceased discharge of pressure wash wastewater to the Hylebos Waterway in June of 1995, after installing a closed loop recycle system for treatment of the water. Nordlund is adequately implementing BMPs to prevent contaminants from the boat repair and maintenance operation from reaching Hylebos Waterway. As a result of these actions, Nordlund is complying with their NPDES permit.

Source Control Effectiveness

Stormwater quality is summarized below:

Date Stormwater Sample Was Taken	Total Suspended Solids (ppm)	Total Recoverable Copper (ppb)
10/3/97 (south drain)	Not measured	120
5/14/98 (south drain)	5	250
5/14/98 (north drain)	3	30
7/15/98 (south drain)	10	720
7/15/98 (north drain)	<3	60

These concentrations of copper exceed the marine chronic and acute water quality standards (both are 3.1 ppb). The appended Technical Memorandum regarding the potential for stormwater discharges to recontaminate sediments suggests no potential exists for copper in stormwater to recontaminate. This site is no longer considered a source of problem chemicals to Hylebos Waterway sediments.

Ecology is concerned about the water quality standard exceedances, and is working with small boatyards to find new ways to reduce the metals loading (such as dustless sanders and stormwater treatment).

5. USG Interiors (2301 Taylor Way; MTCA Agreed Order)

Description of Site and Contamination

USG Interiors (USG) is located on 9.4 acres at 2301 Taylor way, and drains to one stormwater outfall. It is an active rock wool manufacturing plant, which has been in operation at this location since 1959. The plant produces a product typically referred to as mineral fiber insulation or "rock wool". The product process includes mixing and heating raw materials to a molten state, and extruding these materials under pressure to produce mineral fiber. Between 1959 and 1973, ASARCO slag was used as one of the raw materials. After 1973, steel mill slag and basalt rocks replaced the ASARCO slag as a raw material. Solid waste generated during the mineral fiber production process includes shot, off specification mineral fiber, and a smaller volume of baghouse dust. The shot looks like black, well-graded medium to coarse sand. The baghouse dust is typically gray and has the consistency of dry, loose silt.

Some of these wastes are now landfilled and some are recycled. Before 1973, the wastes were spread on the unpaved property between the plant and the waterway, an area measuring about 250'x275'. The wastes were also found in a berm about 500'x30'

on the site (removed in 1996 as part of the cleanup work). One end of the berm was located next to the waterway and the other end was located 500 feet upland.

In June 1992, Ecology took one sample of seep water, one sample of stormwater, and four samples of surficial bank sediments (composited as one) for analysis of metals, including those which are problem chemicals in Hylebos Waterway. The data were as follows:

Problem Metal	Bank Seep Concentration (ppb, total)	Stormwater Concentration at outfall; dry weather (ppb, total)	Marine Chronic Water Quality Standards (ppb)	Bank Sediment Concentration (ppm)	Commencement Bay Sediment Cleanup Objective (ppm)
Arsenic	1460	563	36	82	57
Copper	3750	98	3.1	151	390
Lead	2940	20	8.1	152	450
Nickel	34	10	8.3	17	>140
Zinc	11300	68	86	485	410
Antimony	452	88	None	15	150
Mercury	0.45	0.05	0.025	0.058	0.59

The seep sample contained metals far exceeding water quality standards. Most metals also exceeded water quality standards in stormwater, but to a lesser extent. The bank sediment sample exceeded Commencement Bay Sediment Cleanup Objectives for arsenic and zinc. Sediment samples taken in 1996 at 0-1 foot deep by USG during a pre-cleanup survey of the bank contained much higher metal concentrations (AGI, 1997a); ten samples taken at 0 to -5 feet MLLW contained the following concentration ranges:

Arsenic: 12-2,700 ppb
Copper: 34-3,400 ppb
Lead: 17-4,300 ppb
Zinc: 32-26,000 ppb

It is unclear whether the discrepancy between the 1992 samples and the 1996 samples is due to the difference in depth of samples, location of samples, or both.

USG conducted an site investigation in two phases. The Phase I investigation took place in March, 1994. USG's consultant (AGI Technologies) monitored the quality of groundwater in the surface aquifer (4-9 feet below ground surface) from six of eleven wells, and analyzed eight soil samples (0-12 inches deep) for metals. Two of the wells were placed 25-50 feet from the waterway. Seeps were also identified and mapped. Phase I was completed by May 1994 (AGI Technologies, 1994a).

Soil samples at 0-2 and 2-12 inches contained no problem chemicals exceeding Commencement Bay Sediment Quality Objectives

(later investigation work discussed below showed that soils are contaminated with metals at lower depths). This means that overland transport of problem chemicals into the waterway via stormwater was not a likely pathway of concern.

Groundwater from the two wells placed 25-50 feet from the waterway contained concentrations of problem metals two or three orders of magnitude lower than the seep concentrations shown in the table above (a major source of metal contamination was later discovered between these wells and the waterway, as discussed below).

Higher arsenic concentrations were observed in groundwater from a well 250 feet from the shoreline (1,900 ppb total) where baghouse dust was likely buried, and from a well 850 feet from the shoreline (1,600 ppb total). Soil and groundwater in this part of the site do not appear to currently impact the Hylebos Waterway via direct seepage or erosion into the waterway, because:

1. the contamination is 250 feet from the waterway,
2. surface soils are not contaminated with problem metals,
and
3. wells placed closer to the waterway have much lower metal concentrations.

Phase II investigation work took place in November 1994. AGI Technologies constructed three new wells, including another adjacent to the waterway. AGI sampled the second aquifer (19-29 feet below ground surface) from five wells and the surface aquifer (4-9 feet below ground surface) from nine wells. AGI also sampled water from four seeps, stormwater (one wet-weather sample), and two well boring soil samples from each of seven wells (3-7 feet deep). Ecology also obtained six soil samples from one well (1.5-7 feet deep). AGI completed Phase II February, 1995 (AGI Technologies, 1995).

Phase II surface aquifer samples showed lower arsenic concentrations than Phase I samples. Most Phase II samples from the second aquifer were lower still. Stormwater metal concentrations were lower than during the Phase I testing, but it was not clear whether this was due to the storm drain cleaning or variations due to wet/dry weather sampling (see table below). Seep metal concentrations were also lower than during Phase I testing, but continued to be found far above water quality standards (see table below).

Problem Metal	Bank Seep Concentration (highest from 4 seeps; ppb, total)	Stormwater Concentration at outfall; wet weather (ppb, total)	Marine Chronic Water Quality Standards (ppb)	Commencement Bay Sediment Cleanup Objective (ppm)
Arsenic	590	220	36	57
Copper	930	12	3.1	390
Lead	430	4	8.1	450
Nickel	36	Not detected	8.3	>140
Zinc	650	59	86	410
Antimony	240	Not detected	None	150
Mercury	Not measured	Not measured	0.025	0.59

Each of the 14 well boring soil samples contained arsenic, 11 at levels below the MTCA Industrial Level A threshold (200 ppm). Three soil samples exceeded this threshold (300 ppm, 386 ppm, and 1,200 ppm). The well containing soil at 1,200 ppm is located where baghouse dust was likely buried, and is also the well where the highest groundwater arsenic concentrations were observed.

Source Control Actions

In 1973, USG voluntarily removed surficial waste material between the plant building and the Hylebos waterway. The extent of residual arsenic remaining in the soil after this removal action is unknown. Some of the waste materials were incorporated into a berm along the northwest property boundary between USG and Murray Pacific. This berm was later removed in 1996 to a landfill as described below. The berm was originally constructed to prevent logs from the adjacent log sort yard from rolling onto the USG property.

On March 1, 1994, USG signed an Agreed Order (# DE93TC-S163) with Ecology requiring USG to conduct the two-phase site investigation described above.

In April of 1994, USG cleaned out sludge and sediments from its storm drain lines, catch basins, and manholes (AGI Technologies, 1994b). Some of the storm drain system was in poor condition, allowing infiltration of groundwater.

USG continued stormwater monitoring at the outfall from 12/94 until 5/95 (four dry weather samples). Concentrations of arsenic ranged from 340-1000 ppb, which indicated that the drain cleanout was not successful in reducing stormwater contamination. From February-May 1995, USG conducted a video camera survey and dye-testing to determine where groundwater was infiltrating the drain lines. These studies indicated that there were several areas of groundwater infiltration. In May 1995, USG sealed a leaky main

line joint 16 feet from the outfall and installed plugs in abandoned laterals.

These measures were not successful, as indicated by the last of the four stormwater samples taken after these control actions were performed, which had the highest concentration of arsenic (1,000 ppb) (AGI Technologies, 1996a).

The data from the Phase I and II investigations showed seeps with high concentrations of metals, yet wells 25-50 feet from the waterway showed far lower concentrations. This information suggested that an unidentified source of metals existed between the waterway and the wells. In addition, the information gained from the storm drain work indicated further work was needed to prevent the drains from transmitting contaminated groundwater to the waterway. If a source of metals were found to exist between the wells and the waterway, removal of that source may solve both the seep and stormwater contamination problems. Therefore, Ecology required USG to conduct a bank investigation. These and other needs were included in an amendment to the Agreed Order, signed in August 1995. The complete set of needs were:

1. investigate contaminated materials within and upon the bank of the Hylebos waterway;
2. manage waste products to prevent discharge of contaminated materials to Hylebos Waterway;
3. take additional actions to prevent infiltration of contaminated groundwater into the stormwater line;
4. reduce loading of contaminated groundwater into the waterway by paving the site;
5. produce and implement a compliance monitoring plan, including a three year schedule for groundwater monitoring; and
6. segregate wastes in an upland berm and remove all materials above the MTCA method A industrial cleanup levels (200 ppm for arsenic) to an appropriate landfill.

USG decided, with Ecology concurrence, to specifically respond to the above needs with the following actions: conduct the bank and berm investigation, take actions needed to remove any source material found in the bank above Commencement Bay Sediment Quality Objectives and then resample the seeps, remove any contaminated soils in the berm (above MTCA method A cleanup levels), replace the storm drain lines, pave the site, and monitor stormwater quality quarterly before and after storm drain replacement work.

In February 1996, USG dug eight test pits at various depths (0-4 feet) on the top of the bank adjacent to the waterway, and eight auger borings into the bank slope, 1-2 feet deep. In May, 1996, USG dug three additional test pits. The test pits revealed the presence of shot extending about 140 feet along the waterway at very high concentrations (up to 2,900 ppm). Copper and zinc concentrations were also very high (highest copper concentration was 6,400 ppm and highest zinc concentration was 22,000 ppm) (AGI Technologies, 1996b).

Twenty-five of the shot samples were also subjected to TCLP leach tests (mild acid). The concentrations of arsenic in the leachate averaged 780 ppb (marine chronic water quality standard is 36 ppb). Four of the samples also had high lead concentrations in the leachate, ranging from 720 to 4,000 ppb (the marine chronic water quality standard is 8.1 ppb).

The bank investigation was highly successful in locating the source of the high concentrations of metals in the seep water (and likely the outfall stormwater as well). Based on visual observations and confirmation lab samples, the aerial extent of the contamination zone was defined. In April 1996, Ecology and USG signed a second amendment to the Agreed Order, which required USG to develop and implement a plan for removing contaminated soil from the bank down to the mean low low water level (MLLW), and replacing it with clean fill. The amended order also required USG to replace storm drain lines and pave the site (after the bank cleanup is completed).

During the summer of 1996, USG removed 4,420 tons of contaminated soil in the upland berm area and disposed of it at two landfills (2380 tons to Envirosafe Services landfill in Idaho, and 3,134 tons to Rabanco landfill) (AGI 1996c). Nineteen post-cleanup confirmation soil samples were taken beneath the excavated area. Each confirmation sample was a composite of five samples taken within one of nineteen segmented areas. Additional excavation was needed in a few areas because arsenic exceeded the MTCA cleanup level (200 ppm, based on MTCA Method A industrial). Confirmation soil samples taken below the additional excavation area contained arsenic below the cleanup level.

In July 1997, the contaminated bank soils were removed (3,134 tons) and disposed of at Rabanco landfill (Roosevelt, Washington). Thirty-eight post-cleanup confirmation soil samples were taken throughout the excavated area and analyzed for arsenic, copper, lead, and zinc. The excavated area was restored with quarry spalls covered with pit run sand. In addition, topsoil was placed over the sand above the tide influence and seeded with grass. Site grades were returned to approximate previous grades. EPA will address contaminated intertidal sediment remaining below MLLW during their waterway-wide sediment

cleanup effort. The bank cleanup and restoration effort was documented in AGI (1997b).

In September, 1998, the site was paved. The storm drain lines were replaced by November, 1998. In August 1999, an upland "hot spot" of arsenic-contaminated soil at depth was removed.

Source Control Effectiveness

Most post-excavation soil samples in the bank contained metals below the Commencement Bay Sediment Quality Objectives (CBSQO's). In those few locations where CBSQO's were exceeded, USG excavated further until no exceedances were measured. Water sampled from two seeps in April 1998 and April 1999 (both after bank cleanup) contained metals ranging in concentration as follows:

Arsenic: below detection limit (5 ppb) to 90 ppb
Copper: below detection limit (1-20 ppb) to 31 ppb
Lead: below detection limit (3 ppb) to 6.1 ppb
Zinc: below detection limit (1-50 ppb) to 130 ppb

In addition, water sampled from the new storm drain outfall in April 1999 (a dry weather sample) and May 1999 (after a heavy rainfall) contained metals ranging in concentration as follows:

Arsenic: 60-87 ppb
Copper: below detection limit (10 ppb)
Lead: below detection limit (3-4 ppb)
Zinc: 15-150 ppb

The appended Technical Memoranda regarding the potential for groundwater and stormwater discharges to recontaminate sediments suggests no potential for groundwater to recontaminate sediments and a moderate potential for stormwater (arsenic) to recontaminate sediments. USG suspects that the source of the arsenic may be from a stormwater line that was not replaced (because evidence indicated that the line did not pass through contaminated soil or groundwater). USG is planning to replace the suspect line in the fall of 1999. In addition, Ecology will ask USG to test arsenic levels in current feedstock that is stockpiled onsite. Past feedstock tests have shown no arsenic, and USG claims that stockpiles continue to contain no arsenic.

6. Murray Pacific Log Sort Yard #1 (3502 Lincoln Avenue; MTCA Agreed Order and Consent Decree)

History of Site and Contamination

The Murray Pacific Log Sort Yard #1 is an 18-acre site, located at 3502 Lincoln Avenue, on the corner of Lincoln Avenue and Taylor Way, and adjacent to Hylebos Waterway. The property is owned by Murray Pacific Corporation and has been inactive for several years. Between 1967 and 1985, Murray Pacific Corporation operated the site as a log sort yard. From 1975 through 1980, ASARCO copper smelting slag was used as ballast on site roadways to help support the weight of heavy log sorting equipment. The slag contained arsenic, lead, zinc, and copper, which are problem chemicals for the Head of Hylebos Waterway Problem Area. The grinding of the slag by heavy vehicle traffic, in combination with acidic woodwaste leachate, released metals contained in the slag into the Hylebos Waterway via surface water discharge.

In 1993 ASARCO studied the extent and magnitude of metals contamination in the soil, ditch sediments, surficial waste piles, and surface and groundwaters. The Remedial Investigation report was submitted to Ecology in December 1993 (Hydrometrics Inc., 1993) and the Feasibility Study was submitted to Ecology in February 1994 (Hydrometrics Inc., 1994). Hydrometrics collected 90 soil samples from the surface of the site (from a grid pattern), 20 soil samples at a two-foot depth, and 35 soil samples from 11 wells at depths ranging from 2 to 26 feet below ground surface. About 80% of the surface soil samples contained metals exceeding threshold levels initially selected for the site (Commencement Bay Sediment Quality Objectives within 20 feet of the waterway, and MTCA industrial cleanup standards for the remainder of the site). Soils at depth showed far less widespread contamination. Only about 9% of samples taken below 0.5 feet exceeded the initial threshold levels.

Hydrometrics installed 15 wells to monitor groundwater quality for metals, and also sampled five other pre-existing wells. Thirteen of the wells were installed to measure water quality from the lower aquifer (20-35 feet deep), five were installed in the upper aquifer (5-16 feet deep), and one was installed across both aquifers. Water was sampled quarterly from 2/92 until 9/93. Among six wells close to the waterway, one contained arsenic in the shallow aquifer at levels consistently above marine chronic water quality criteria (MCWQC) (samples averaged 142 ppb arsenic,

MCWQC is 36 ppb). A seep sampled from the bank contained arsenic at a similar concentration (200 ppb).

Higher concentrations of arsenic were found in water from two wells located farther from the waterway (225 and 350 feet). Arsenic concentrations ranged from 930 ppb to 8,000 ppb. The wells were located where an old ditch once existed at the northeast boundary of the site (filled in years before the site was investigated). However, two other wells placed in the old ditch closer to the waterway did not contain contaminated groundwater.

Before the site was cleaned up, precipitation drained to ponds on site and to a ditch in the southwest portion of the property. This ditch connected to Hylebos Waterway via an 18" storm drain line and was referred to as the "central ditch". Stormwater from this ditch contained high levels of arsenic; it has been sampled during three investigations: Norton and Johnson, (1985), Kennedy/Jenks/Chilton (1987), and Hydrometrics (1993). Norton and Johnson (1985) was an investigation conducted by Ecology. Total concentrations of arsenic measured during these investigations ranged from 560-29,000 ppb (marine chronic water quality standard is 36 ppb).

Hydrometrics took sediment samples from the central ditch in four locations at 0-8", 12", 24" and 36" depths for metals analyses. Metals concentrations exceeded Commencement Bay Sediment Quality Objectives, decreasing substantially with depth.

Source Control Actions

In September 1991, Agreed Order # DE 91-S234 was signed between Ecology and the Murray Pacific Corporation and ASARCO, requiring Murray Pacific and ASARCO to conduct a remedial investigation and feasibility study (RI/FS) (described above). Based on these investigations, Ecology determined that 34,000 cubic yards of soil and ditch sediments were sufficiently contaminated to justify remediation. Ecology issued a Cleanup Action Plan in November 1994. The Cleanup Action Plan required Murray Pacific and ASARCO to remove soil, ditch sediments, and wastes exceeding 57 ppm arsenic within 20 feet of the waterway, and 200 ppm arsenic elsewhere. The Cleanup Action Plan also required post-cleanup groundwater monitoring and soil sampling. In 1995, Ecology, Murray Pacific, and ASARCO signed Consent Decree # 95-2-12876-4, which required Murray Pacific and ASARCO to implement the Cleanup Action Plan.

In 1996, the cleanup was completed to Ecology's satisfaction. Murray Pacific and ASARCO voluntarily decided to clean up the entire site to the MTCA residential standard (20 ppm arsenic) to improve the marketability of the site. Soil containing arsenic between 20 and 100 ppm was removed and disposed of at the ASARCO smelter site (31,000 cubic yards, or 50,000 tons). Soil containing arsenic above 100 ppm was disposed of at the Columbia River landfill in Oregon (91,000 cubic yards, or 146,000 tons). Post-cleanup upland soil sampling (493 samples throughout the site) demonstrated that the MTCA residential cleanup levels had been achieved throughout the site (Hydrometrics, 1996). The excavated soil was replaced with 161,000 tons of clean backfill rock surfacing, and was regraded to drain to an oil-water separator which discharges to Hylebos Waterway. No stormwater sampling was required because only clean fill exists on the site at the surface.

Murray Pacific and ASARCO also volunteered to investigate and clean up intertidal sediments containing arsenic above 57 ppm (the Commencement Bay Sediment Quality Objective) in front of the Murray Pacific site. In 1996, intertidal sediments were removed down to native marsh silts. The area excavated is shown on a map contained in Attachment 1. Twenty-one confirmation soil samples were taken at 50-foot intervals. Based on the results of the confirmation samples, the sampled area was either prepared for backfill or further excavated. All final excavation samples were below the Commencement Bay Sediment Quality Objective for arsenic (Hydrometrics 1996).

Source Control Effectiveness

Post-cleanup upland soil sampling demonstrated that the MTCA residential cleanup levels had been achieved throughout the site. Post-cleanup groundwater monitoring data were obtained twice in 1997 (January and July) and twice in 1998 (February and July) from three pairs of new wells. One well from each pair was used to sample the shallow aquifer and the other well was used to sample the deeper aquifer. Two pairs of wells were located near the waterway. Total metals data from these wells are summarized in Attachment 1 (from Shenk and Associates, 1998).

The appended Technical Memorandum regarding the potential for metals in groundwater to recontaminate sediments suggests no potential. No post-cleanup data were available for stormwater. However, the surface of the site is now clean backfill gravel, which prevents any residual metal from contacting stormwater.

Therefore, Ecology believes this site is no longer a source of problem chemicals to Hylebos Waterway sediments.

7. U.S. Gypsum Landfill (U.S. Highway 99; pre-MTCA cleanup)

Description of Site and Contamination

U.S. Gypsum Landfill (also known as USG Corp Highway 99 Site) is a 3-acre site located between US Highway 99 and Interstate 5 west of the Town of Milton. Between 1971 and 1973 this site received baghouse dust comprised chiefly of insulation produced by USG from ASARCO slag. The baghouse dust, which was 10% of the total waste, contained 21.7% arsenic, which is a problem chemical for the Hylebos Waterway Problem Area. Drainage from the site is toward Hylebos Creek.

In 1985, Ecology approved USG's post-cleanup groundwater monitoring plan, which required USG to sample two wells for groundwater in 1986 (USG, 1984b). If concentrations of arsenic in the wells were below 0.5 ppm, no additional monitoring would be required.

Source Control Actions

In August 1984, Ecology and U.S. Gypsum signed a Consent Order requiring U.S. Gypsum to excavate and remove wastes containing arsenic. USG developed a cleanup plan (USG, 1984a), and Ecology approved it in 1984. The cleanup was completed to Ecology's satisfaction in January 1985. USG removed 28,500 tons of contaminated waste material. Thirty post-cleanup confirmation soil samples were taken, and three tested above the soil cleanup level of 0.5 ppm arsenic. Additional excavation work was conducted in those areas until the cleanup level was achieved.

Source Control Effectiveness

The average of two groundwater samples taken in 1986 was below the groundwater cleanup level (also 0.5 ppm), and Ecology determined that additional groundwater sampling was not required. All post-cleanup soil confirmation samples were below the soil cleanup level of 0.5 ppm.

Ecology believes that the actions taken by U.S. Gypsum were sufficient to keep arsenic out of Hylebos Creek. Evidence supporting this conclusion includes arsenic sediment data from 1993 (see Attachment C to Milestone 1 Report of Head of Hylebos Waterway, Ecology 5/4/93) as well as analysis of sediment samples taken by the Hylebos Waterway Cleanup Committee from the creek bottom near the Head of Hylebos Waterway (concentrations of arsenic in the creek bottom did not exceed the sediment quality objective for arsenic).

8. Don Oline Marine View Drive Autofluff (2120 Marine View Drive; MTCA Consent Decree)

Description of Site and Contamination

The waterway side of this property at 2120 Marine View Drive has been used to store old pieces of equipment, tanks, and other miscellaneous junk for an unknown period of time. Two concrete bulkheads exist at the shoreline, where barges are sometimes beached for maintenance. The front of the site, facing Marine View Drive, is leased to Mather Auctioneers.

In 1992, Ecology inspectors discovered automobile shredder residue (ASR), a by-product of the automobile dismantling industry, as a fill material adjacent to Hylebos Waterway. The material was found in a short "bluff" type bank that exposed to erosion from the tides. A sample of the material contained 44 ppm arsenic, 82.1 ppm cadmium, 2820 ppm copper, 4120 ppm lead, 431 ppm nickel, 13,700 ppm zinc, and 412 ppb total PCB. With the exception of arsenic and nickel, these concentrations substantially exceed the Commencement Bay Cleanup Objectives (57 ppm for arsenic, 5.1 ppm for cadmium, 390 ppm for copper, 450 ppm for lead, and 300 ppb for PCB). The site owner later dumped concrete rubble along this bluff.

In 1993, Ecology asked Mr. Oline to dig ten test pits to determine the extent of the ASR and to conduct a TCLP leach test on the samples to determine whether the waste designates as dangerous waste. In 1993, the ten pits were dug, six of which contained ASR to a depth of about 4 feet. Soil samples from two of the pits failed the TCLP test for metals (one failed for lead and the other failed for cadmium).

Ecology then requested Mr. Oline to obtain a shoreline permit so that he could remove the material from the shoreline voluntarily. While the permit application was being processed, additional ASR was discovered in the tidal area adjacent to the site. At that point, Ecology determined that a voluntary action would not be appropriate for the site cleanup. Ecology then requested the City of Tacoma to remove the clean up activities from the shoreline permit (which included other site improvements for a different part of the site), and Ecology began to pursue the site as a formal MTCA clean-up.

However, before the formal MTCA process was initiated, General Metals volunteered to conduct a site investigation on the Don Oline site (EMCON Northwest, 1995). The site investigation was completed in January, 1995, and involved digging 34 upland test pits and 26 intertidal test holes. Two monitoring wells were also installed. The investigation delineated the extent of the

ASR, which covered about 1,230 square yards on the upland and 533 square yards in the intertidal zone. The upland ASR was an average of 3 feet thick, and the intertidal ASR averaged about 6 inches thick.

One composite ASR sample from the three test pits was analyzed for total metals. Ecology reported the results of the composite sample analysis in terms of average values, as follows: arsenic (21 ppm), cadmium (28 ppm), copper (1,866 ppm), lead (1,533 ppm), mercury (1.5 ppm), nickel (312 ppm) and zinc (6,633 ppm). With the exception of arsenic, these concentrations exceeded the CBSQOs.

Soils underlying the ASR in two of the test pits were also sampled for total metals and PCBs. No exceedances of MTCA method A Industrial Soil Cleanup levels or Commencement Bay Sediment Quality Objectives were observed.

Samples from four of the intertidal ASR test holes were analyzed for total cadmium, lead, and PCBs which individually exceeded the CBSQOs. The four samples were composited and Ecology reports the results in terms of average values, as follows: total copper (3,890 ppm), mercury (1.3 ppm), nickel (130 ppm) and zinc (3,550 ppm). With the exception of nickel, these concentrations exceeded the CBSQOs.

The site investigation also included installation of two monitoring wells. Three attempts were made to drill a third monitoring well, but in each case no water was found before encountering gray clay silt at the base of the ASR. Groundwater appeared to occur only sporadically at the site. The groundwater encountered was perched on the gray clayey silt within the ASR only. Groundwater was sampled for total and dissolved arsenic, cadmium, copper, lead, mercury, nickel, zinc, and total PCBs. Total copper, lead, zinc, and nickel exceeded marine chronic water quality criteria (MCWQC) in two or three of the wells. Maximum total metal concentrations observed were: 34 ppb for copper (MCWQC=3.1 ppb), 100 ppb for lead (MCWQC=8.1 ppb), 300 ppb for zinc (MCWQC=76.6 ppb), and 54 ppb for nickel (MCWQC=8.3 ppb). With the exception of nickel, dissolved metal concentrations were below the MCWQC. Total PCBs also significantly exceeded the marine water quality criteria in two wells (concentrations observed were 121 and 41 ppb, and the marine acute water quality criteria for all PCB arochlors combined is 0.21 ppb).

Source Control Actions

General Metals (now owned by Schnitzer Steel) reached an agreement with Don Oline in 1996 regarding additional financial liability for the cleanup. The agreement placed Don Oline in the lead for the cleanup. In 1996, Ecology and Don Oline signed a MTCA Consent Decree (#97-2-09719-9), requiring Don Oline to

remove ASR on his property and intertidal ASR down to about 0 feet Mean Lower Low Tide. The cleanup standards for upland soils were 10 ppm for PCBs and cadmium, 1,000 ppm for lead, and 1 ppm for mercury. They were based on MTCA Method A Industrial soil cleanup levels. The intertidal sediment cleanup standards were the Commencement Bay Sediment Quality Objectives for acenaphthene, fluoranthene, fluorene, phenanthrene, bis-(2-ethylhexyl)phthalate, butylbenzylphthalate, dimethylphthalate, di-n-butylphthalate, n-nitrosodiphenylamine, dibenzofuran, cadmium, copper, lead, mercury, nickel, and zinc.

By January, 1998, all upland contaminated soil (1085 tons) was removed and disposed at Rabanco Landfill in Klickitat County. Intertidal sediment (474 tons) was removed as far as a back hoe could reach during low tide and disposed at Hidden Valley Landfill in Pierce County. The extent of excavation in the intertidal area is depicted in Attachment 2. The excavated areas were replaced with clean fill. In the intertidal area, the particle size distribution of the fill was designed to maximize habitat for aquatic organisms ("fish mix"). In addition, a slope resembling the pre-existing bank was re-established (Environmental Partners, 1998).

Source Control Effectiveness

For the intertidal work, post-cleanup confirmation sampling was initially conducted on a subset of chemicals to determine if further excavation was needed. Several additional excavation efforts were needed after the first. When the screening test showed no exceedances of the subset of chemicals, then a full suite of chemicals was analyzed as well. If exceedances were observed, then further excavation work was initiated until none of the full suite of chemicals exceeded cleanup standards. Thirty-six sampling locations were used to demonstrate compliance. All final confirmation samples met all of the intertidal cleanup standards (the complete list) unless method detection limits exceeded the standard (this occurred in all cases for n-nitrosodi-phenylamine, and in a few cases for bis-(2-ethylhexylphthalate), di-n-dibutyl-phthalate, and dimethylphthalate) (Environmental Partners, 1998).

Detection levels for all analyses (36 samples) of n-nitrosodiphenylamine exceeded the Commencement Bay Sediment Quality Objective (CBSQO) of 28 ppb by factors ranging from 3.5 (for 33 samples) to 7-17.8 (for 3 samples). In all cases, n-nitrosodiphenylamine was not detected. This chemical is not a problem chemical for the Head of Hylebos Problem Area.

Detection limits for phthalates (bis-2-ethylhexyl, di-n-dibutyl and dimethylphthalate) were exceeded, but not in all analyses. For bis-2-ethylhexylphthalate, 4 of 36 analyses had a detection limit of 2,500 ppb (CBSQO is 1,300 ppb); otherwise, the levels of

this chemical in confirmation samples were below the CBSQO. For di-n-butyl phthalate, 2 of 36 analyses had a detection limit of 2,500 ppb (CBSQO is 1,400 ppb), and it was detected in only one of the 34 analyses where the detection limit was below the CBSQO. For dimethylphthalate, 3 of 36 analyses had detection limits of 500 and 200 ppb (CBSQO is 160 ppb); otherwise, this chemical was not detected in any of the 33 analyses where detection limits were below the CBSQO.

The upland work also required multiple excavations, but did not use a subset of chemicals for initial characterization because there were only four chemicals requiring analysis. Nineteen sampling locations were used to demonstrate compliance. All final confirmation samples met all of the upland cleanup standards (Environmental Partners, 1998).

The Consent Decree did not require post-cleanup groundwater monitoring because:

1. the source of the groundwater contamination was removed;
2. pre-cleanup groundwater samples were taken within the ASR, and now the ASR is gone; and
3. groundwater could not be found beneath the ASR - it was only located within the ASR itself.

This site is no longer considered a source of problem chemicals to the Head of Hylebos Waterway sediments. Although detection limits were above the Commencement Bay Sediment Cleanup Objectives for some problem chemicals in the intertidal confirmation sediment samples, the excavated area was backfilled with one to four feet of clean sand. This layer of clean fill should prevent epibenthic biota from being exposed to any possible residual contamination from problem chemicals.

9. Woodwaste Sources (Louisiana Pacific, Manke Lumber, and Weyerhaeuser)

The transport, storage, sorting and transfer of logs within the Head of Hylebos Waterway Problem Area has contributed to the accumulation of bark and wood debris on and in sediments within the Head of Hylebos Waterway Problem Area. Although this has not resulted in exceedances of Head of Hylebos Waterway problem chemicals, it has decreased the diversity and abundance of benthic organisms as determined by studies conducted by the Hylebos Cleanup Committee (Striplin Environmental Associates, 1995). Studies conducted by the Wood Debris Group show benthic impacts likely correspond to percent wood debris (e.g., wood fluff, chips, bark, logs), mixed in with or lying on top of sediments, combined with the effects of slow circulation and

lower dissolved oxygen levels in the upper turning basin. Log rafting practices such as grounding and raft storage up into the intertidal zone also contributed to benthic impacts.

In December, 1997, Ecology signed a MTCA Agreed Order (#DE 97TC-5437) with Louisiana Pacific, Manke Lumber, and Weyerhaeuser ("Wood Debris Group") to:

1. determine the horizontal and vertical extent and volume of sediments adversely impacted by wood debris in the Head of Hylebos Waterway Problem Area;
2. develop a Cleanup Study Report and a Cleanup Action Plan; and
3. develop and implement an Operations, Maintenance, and Monitoring Plan for source control to ensure that future management practices do not recontaminate sediments after cleanup.

The Wood Debris Group (WDG) has completed sampling in support of activity #1, and has completed both deliverables described in activity #2. The WDG is developing an Operations, Maintenance, and Monitoring Plan in which log rafting, storage, and transfer practices will be modified to reduce impacts to the basin. Phased cleanup is expected to occur in 2000.

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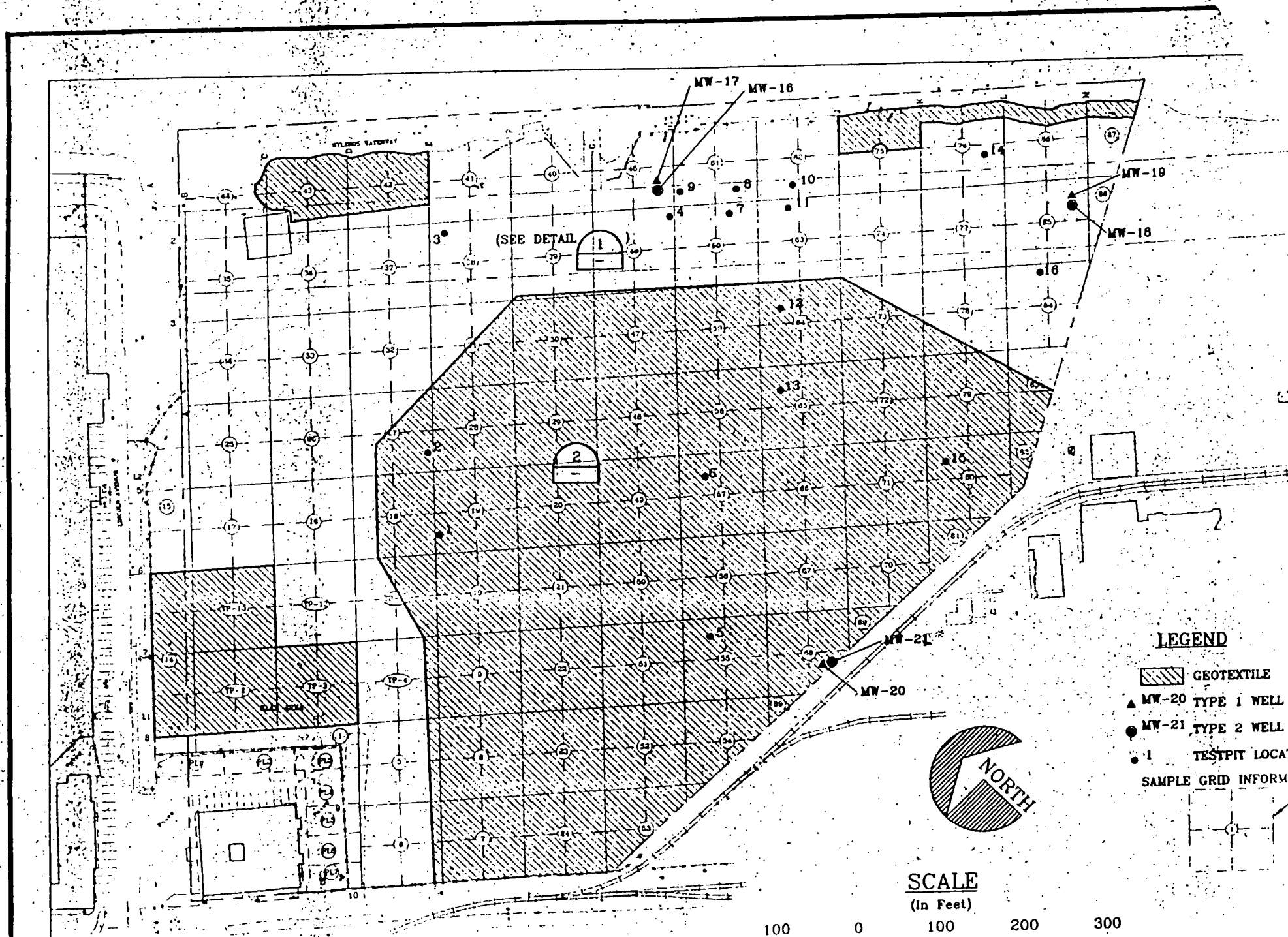
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ATTACHMENT 1

Murray Pacific

Well Map, Post-Cleanup Groundwater Data (Shenk and Associates, 1998), and Map Showing Limit of Intertidal Remedial Excavation (Hydrometrics, 1996)



MURRAY PACIFIC YARD #1 MONITORING WELL DATA

Total Arsenic (mg/L)

Well #	1/15/97	7/23/97	2/3/98	7/17/98
MW-16 (D)	<0.020	0.0012	<0.001	0.024
MW-17 (S)	0.28	1.1	0.75	0.97
MW-18 (D)	<0.020	0.0015	<0.001	0.0071
MW-19 (S)	0.065	0.15	0.17	0.28
MW-20 (S)	<0.020	0.024	0.092	0.04
MW-21 (D)	<0.020	<0.001	<0.001	0.065

Total Copper (mg/L)

Well #	1/15/97	7/23/97	2/3/98	7/17/98
MW-16 (D)	<0.020	0.0036	<0.001	<0.001
MW-17 (S)	0.16	0.01	0.0024	0.0014
MW-18 (D)	<0.020	0.0023	0.0011	<0.001
MW-19 (S)	<0.020	0.0058	0.0028	0.0055
MW-20 (S)	0.048	0.011	0.0013	0.015
MW-21 (D)	<0.020	0.0023	0.0037	0.0028

Total Lead (mg/L)

Well #	1/15/97	7/23/97	2/3/98	7/17/98
MW-16 (D)	<0.020	0.0011	<0.0005	<0.0005
MW-17 (S)	0.22	0.025	0.0051	0.0019
MW-18 (D)	<0.020	<0.0005	<0.0005	<0.0005
MW-19 (S)	<0.020	0.00057	<0.0005	<0.0005
MW-20 (S)	<0.020	0.0013	<0.0005	0.0023
MW-21 (D)	<0.020	<0.0005	<0.0005	<0.0005

Total Zinc (mg/L)

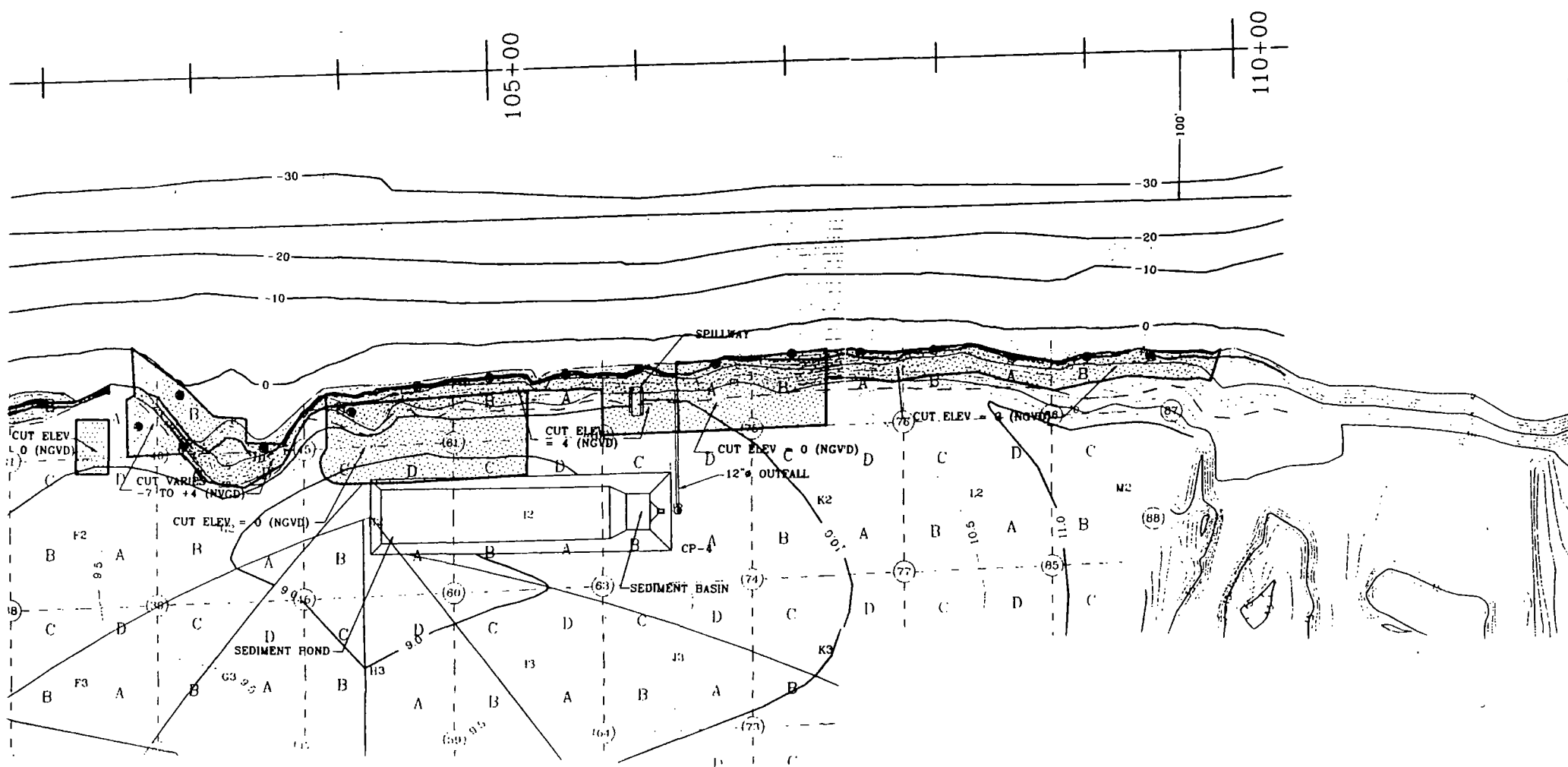
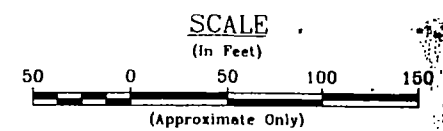
Well #	1/15/97	7/23/97	2/3/98	7/17/98
MW-16 (D)	<0.020	0.0079	<0.002	<0.002
MW-17 (S)	0.25	0.013	0.0051	0.0022
MW-18 (D)	<0.020	0.0027	<0.002	<0.002
MW-19 (S)	<0.020	0.0041	<0.002	<0.002
MW-20 (S)	0.34	0.024	0.0094	0.022
MW-21 (D)	<0.020	0.0033	<0.002	<0.002

Note: The data represents split samples analyzed for Murray Pacific Corp. at Sound Analytical Services, Inc. in Tacoma, WA.

The "<" symbol is used to denote the laboratory's detection limit in cases where the constituent was reported as Not Detected.

(D) = deep marine sediment well: MW-16 screened at 15-20 feet; MW-18 screened at 17.5-22.5 feet; MW-21 screened at 25-30 feet.

(S) = shallow dredge fill well: MW-17 screened at 7-11 feet; MW-19 screened at 5-10 feet; MW-20 screened at 5-9 feet.



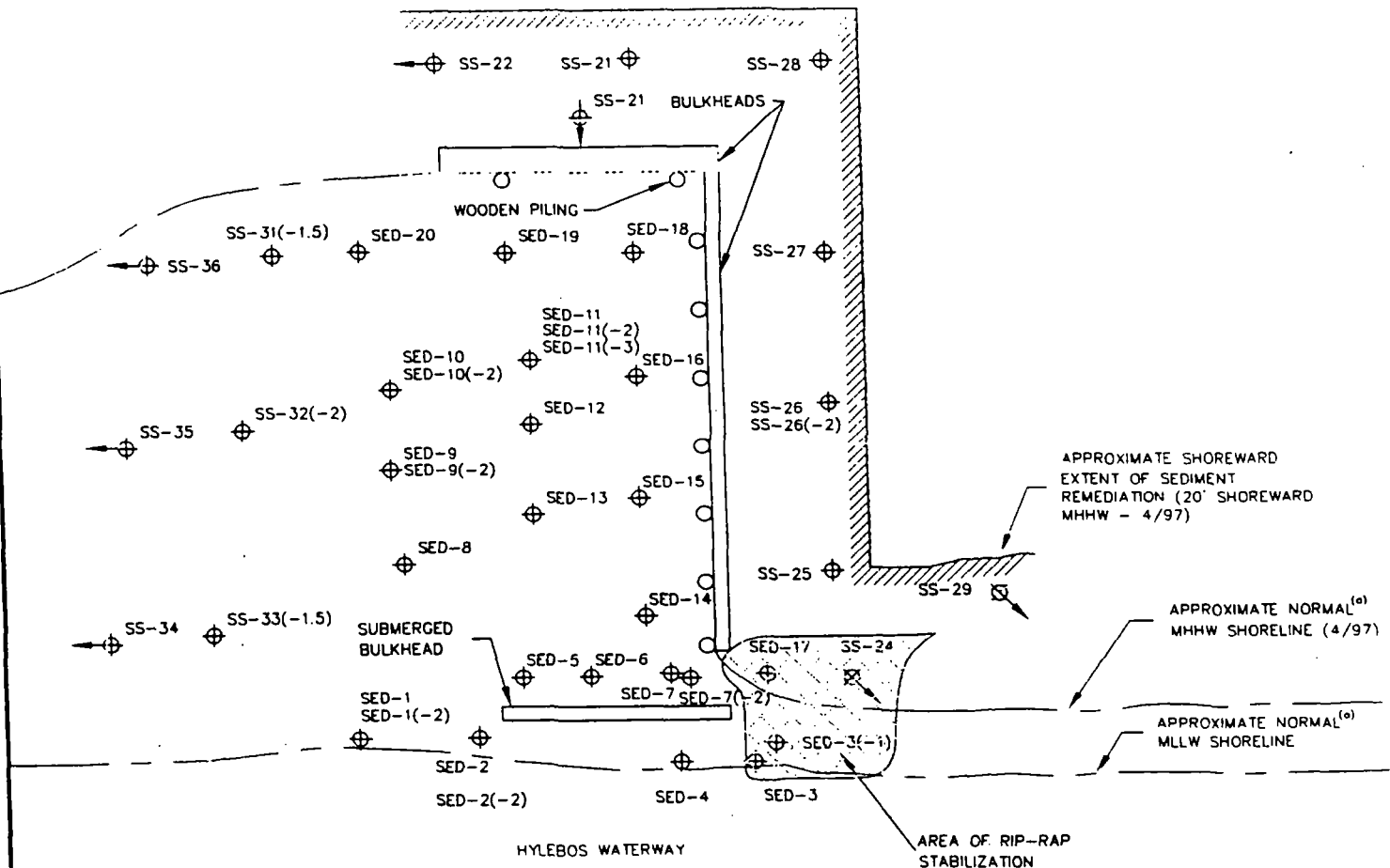
ATTACHMENT 2

Don Oline Site

Limit of Intertidal Remedial Excavation and Performance Sampling
Locations (Envrionmental Partners, 1998)



SCALE: 1" = 20'



(a) PRIOR TO ANY SITE EXCAVATION/REMEDIATION

LEGEND

- SED-1 SEDIMENT-BOTTOM SAMPLE
- SS-26(-2) SEDIMENT-BOTTOM SAMPLE WITH DEPTH BELOW ASR-SEDIMENT CONTACT
- SS-32 SEDIMENT-EDGE OF EXCAVATION SAMPLE
- LIMIT OF INTERTIDAL REMEDIAL EXCAVATION
- APPROXIMATE MHHW & MLLW SHORELINE (AS LABELED)

ENVIRONMENTAL
PARTNERS INC
10940 NE 33rd PLACE, STE. 110
BELLEVUE, WASHINGTON 98004
TEL. 425-889-4747
FAX 425-889-4755

FIGURE 2 LIMIT OF INTERTIDAL REMEDIAL EXCAVATION AND PERFORMANCE SAMPLING LOCATIONS

PROJECT		18601.0 DON OLIVE AUTOFLUFF SITE			
PREPARED FOR		HYLEBOS MARINA			
LOCATION		2120 MARINE VIEW DRIVE TACOMA, WASHINGTON			
SHEET		DRAWN BY	REVIEWED BY	DATE DRAWN	
1 of 1		UCL	TCM	11/17/97	